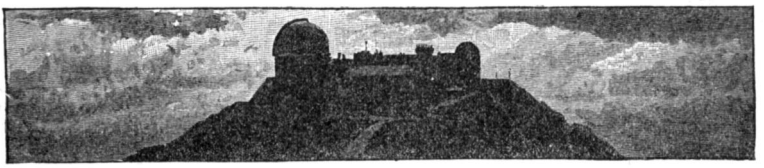

NOTICES FROM THE LICK OBSERVATORY.

PREPARED BY MEMBERS OF THE STAFF.

ATLAS PHOTOGRAPHIQUE DE LA LUNE, PUBLIÉ PAR L'OBSERVATOIRE DE PARIS, EXÉCUTÉ PAR MM. LOEWY ET PUISEUX. *Premier fascicule*, Paris, 1896. *Mémoire* et *Atlas* de six planches.

The library of the Lick Observatory has just received the magnificent Atlas of the Moon published by the Paris Observatory, from negatives taken with the equatorial *coudé* by MM. LOEWY and PUISEUX, and reproduced in heliogravure by the care of M. FILLON. The original negatives were some six and a half inches in diameter, and they have been subsequently enlarged in the camera fourteen or fifteen diameters to the scale of publication.

The operations required for the production of lunar maps are of three sorts:

1st. To obtain suitable negatives. (Only a few of the very first excellence have been obtained in the past two years at Paris, owing to unsteady air, and at all observatories the very best conditions are required.)

2d. Enlargement of the original negatives on glass in the camera. (Each negative is enlarged to the greatest size which is advantageous at Paris.)

3d. Reproduction of the enlargèments on paper. (Heliogravure has been chosen for the Paris Atlas.)

The best focal negatives obtained at Paris and at Mt. Hamilton appear to be of the same order of excellence. This is shown by comparing silver-prints of enlargements by Professor WEINEK from various Paris and Mt. Hamilton negatives. There is little to choose between them. Both are very good.

Direct enlargements in the telescope are extremely advantageous on many accounts, but they are difficult to make when large instruments are employed. (See *Publications* of the Lick Observatory, Vol. III, p. 16). This method has been tried at Paris and abandoned for the present. It was unsuccessful at Mt. Hamilton until 1895, when Mr. PERRINE made changes in our driving-clock, which have allowed us to use it to great advantage. The devices applied by Mr. PERRINE were but makeshifts; and it is only in 1896 that the necessary funds have been obtained for providing suitable change-wheels for lunar rate (and these have not yet been received from the makers).

The CRAMER Dry Plate Company has lately been able to supply us with extremely rapid emulsions, which have allowed us to reduce the exposure-times for direct enlargements to ten seconds, or even to five seconds. Short exposures are the chief factors in such celestial photographs.

The direct enlargements at Mt. Hamilton give an image of the Moon some twenty-six inches in diameter, and the resulting plates are, of course, of relatively finer grain than the focal images. They have been enlarged on glass, by Mr. COLTON, to the scales of III feet, VI feet, and X feet to the Moon's diameter with excellent results. The VI-foot scale shows, however, everything that can be seen in the X-foot enlargements, and the III-foot shows nearly all that is given by the VI-foot, though the details are not so readily seen, of course.

Baron A. v. ROTHSCHILD, of Vienna, has also enlarged several of our focal negatives (on carbon) to the VI-foot scale, and Mr. NIELSEN and Professor PRINZ have done the same. Many negatives of the Moon have been taken by Professor W. H. PICKERING at the Harvard College Observatories at Cambridge and Arequipa, some of them being excellent, but none have yet been published, I believe.

On account of the great expense of publication (a very important point at Mt. Hamilton), the Lick Observatory has decided to issue its Observatory Moon Atlas on a scale of III French feet (38.36 English inches, 97.45 *cm.*) to the Moon's diameter. This is the scale of MAEDLER'S and LOHRMANN'S charts, and one-half that of SCHMIDT'S. The negatives taken in the telescope are slightly enlarged (by Mr. COLTON) in the camera, and are reproduced for publication by the gelatine process by the New York Photogravure and Color Company, 241 W. Twenty-third Street, New York City.

Trials of the heliogravure process and of direct carbon printing were made before adopting the gelatine process (which is much less expensive than either of them). It appears to be true that in America, at least, neither of the foregoing processes can be depended on to give as good and uniform results as the gelatine method.

Focal negatives of the Moon are regularly taken at Mt. Hamilton (by Messrs. HOLDEN and COLTON), and some of them are sent to the Observatory at Prag, where Professor WEINEK enlarges them to a scale of about X feet to the Moon's diameter. He proposes to issue an atlas of the Moon in sheets about 9½ x 11½ inches to the X-foot scale. Silver prints of most of Professor WEINEK'S enlargements (several hundred in number), have been sent to the Lick Observatory. Heliogravure and gelatine prints are permanent. Silver prints will deteriorate with time, though they have several advantages over any mechanical process of publication.

Every method of reproduction necessarily introduces a *grain* which is not in the original negative. The silver print seems to introduce less *grain* than any other process. So far as my limited experience goes, the *grain* from carbon printing and from heliogravure is about the same, and that due to the gelatine process is less objectionable than either. The gelatine prints require careful handling to prevent smearing, which is a drawback. A careful comparison has been made of the Paris charts with reproductions of the Lick Observatory negatives on gelatine (III-foot), by direct carbon printing (III-foot), with Baron v. ROTHSCHILD'S carbon enlargements (VI-foot), with Professor WEINEK'S silver-print enlargements (X-foot), and with Mr. COLTON'S enlargements on glass (VI-foot and X-foot), with particular reference to determining the special excellence of each process of reproduction. It appears to show conclusively that the silver-prints of Professor WEINEK (X-foot scale) come nearer to technical perfection than any other, in that they most successfully reproduce the grain of the original negative and therefore are best fitted to show the finer details of the lunar surface. (Compare, for example, Professor WEINEK'S enlargement of *Archimedes* and vicinity from the Lick Observatory focal negative of 1893, August 3d, with the same subject shown — on a smaller scale — in the Paris chart of 1894, February 13th.) Professor WEINEK'S scale is, in my opinion, somewhat too large for general use. It is particularly suitable for special studies.

The general effectiveness of the Paris heliogravures is, on the other hand, wonderfully fine, and superior in this respect to any reproductions I have seen, except those on glass by Mr. COLTON.

As glass diapositives cannot be widely distributed, such heliogravures as the Paris maps must hold the palm for plastic excellence.

Copies on glass of some of the Mt. Hamilton negatives can be seen, however, in Paris (Astronomical Society of France, National Observatory); in London (Royal Astronomical Society, British Astronomical Association); in Berlin (Royal Academy of Sciences); in Rome (Accademia dei Lincei); Copenhagen (Royal Observatory); Washington (Smithsonian Institution); etc., etc.

The grain of the gelatine reproductions of the Lick Observatory direct enlargements is very much finer than that of the Paris maps (as it should be, considering the advantage of working from original negatives twenty-six inches in diameter), though the original grain of the negatives is not reproduced. It is to be remarked, however, that the grain of different gelatine prints differs from print to print, but it is fine in all. The effectiveness —relief—of the Lick Observatory maps is satisfactory.

It is important that the various prints from a single negative should be uniform in quality. This uniformity can be readily obtained in silver printing. In heliogravure and in the gelatine process it must be secured by careful proof-reading. In the direct carbon printing and enlargement it is not so easy, so far as my very limited experience goes. The method of reproduction chosen by Professor W. PRINZ* is not as satisfactory as any of the foregoing processes.

The above comparisons refer only to the excellence of the several processes of reproducing the data of a given negative. It is important to recollect, also, that in such reproductions one may work for two quite different results.

1st. The effort may be to attain the boldest relief possible—to give the resulting maps the greatest plastic effect. To accomplish this end the resulting plate must be made as sharp and precise as practicable (the edges of craters as definite as possible, for example) and the contrasts of light and shade on the moon must consequently be exaggerated—made more harsh.

2d. The effort may be to retain, in the reproductions, the greatest amount of detail (on the bright illuminated surfaces just

* See *Publications* A. S. P., Vol. VI., page 256.

within the rims of craters, for example) and to preserve the faint contrasts on the moon in their true values, so far as may be. (Compare the frontispiece to *Publications* of the Lick Observatory, Vol. III., with the first plate of the Paris maps.) Both effects cannot be successfully obtained from a single negative. The Paris maps seem to have been made with the first object in view, if I am not mistaken. At any rate, they have most successfully attained it.

The Mt. Hamilton enlargements have been purposely made with the second object in mind; and they have, I think, attained it.

The effort of Professor WEINEK has been to reproduce the minutest particularities of the original negative; and he has certainly accomplished this end.

The results, 1st and 2nd, may be consciously sought for by the astronomer in making his enlargements on glass, or they may be forced upon him by the processes of heliogravure. A good example of *unnecessary* sharpening and consequent loss of detail within the high lights (with a gain of precision at the terminator) is shown in the plate facing page 39, of Vol. III, *Publications* of the Lick Observatory (see the remarks on page 15, *op. cit.*)

The maps of Professor WEINEK are on the X-foot scale; those of the Paris charts are of varying scales ($2^m.58$ = 101.57 inches; $2^m.50$ = 94.49 inches); those of the Lick Observatory are of III-feet. The Paris Atlas sheets are 24 x 30 inches; those of the Lick Observatory are 16 x 20 inches. The latter size seems to be as large as is convenient for use at the telescope, though the Paris charts are considerably more impressive.

The *Memoir* accompanying the Paris charts contains many excellent remarks upon lunar charts, and upon the topography and physical condition of the Moon, which there is no space to refer to here. The great advantage of lunar photographs over even the best lunar drawings is insisted upon. It is pointed out that drawings must be executed over relatively small areas at a time, and that it is practically impossible to fit these drawings together subsequently with strict accuracy. The same remark applies to all attempts to make a complete map of the Moon by combining drawings with photographs.

Finally, it may be said that the Paris lunar charts already published constitute a splendid contribution to science. Their plastic relief is unrivaled and is not likely to be surpassed. Taken together with other maps and charts now published, or to

be published (WEINEK, Lick Observatory, PICKERING, NIELSEN, FAUTH, PRINZ, SCHMIDT, LOHRMANN, GAUDIBERT, KLEIN, MAEDLER, NEISON, etc.), they provide a sure basis for a present scientific account of the lunar surface and promise future results of great importance. EDWARD S. HOLDEN.

MT. HAMILTON, November 3, 1896.

METEOR SEEN AT NOON (NOVEMBER 1).

A meteor, leaving a broad scintillating track, traversed fifteen degrees of the northwestern heavens at about ten minutes past noon yesterday. It was seen at a point about thirty degrees above the horizon, and in the half second of its flight shone as an electric light. The shooting star was seen by a visitor at the Park, in San Francisco.—*S. F. Chronicle*, November 2.

A BRIGHT METEOR SEEN ON OCTOBER 8, 1896.

Mr. P. PERRINE, of Alameda, reports a meteor four or five times as bright as *Venus* on October 8, 1896, at $7^h\ 32^m$ P.M. It was of a brilliant white color and moved rapidly from an altitude of about thirty degrees to near the horizon, inclining toward the east at an angle of about forty-five degrees. C. D. P.

THE METEOR OF OCTOBER 22, 1896.

In the evening of October 22d, while in Oakland, I saw an unusually interesting meteor. I first saw it a little north of west, where it seemed to rise like a sky-rocket, which it so much resembled that at first I had no thought of its true character. Its apparent motion after the first few seconds was almost exactly parallel to my horizon. At first sight the head appeared to be single, but after two or three seconds (during which time it rapidly increased in brightness), it separated into four parts but not with the usual explosive effect, for all the parts pursued the same course in a straight line, each leaving its train of sparks which reached to the next part, a long train following all. The last portion was much the faintest and soon disappeared, while the remaining three were of more nearly equal brightness, the first being somewhat brighter than the others.

After traversing an arc of ninety degrees or more, they all disappeared at $6^h\ 9^m\ 30^s \pm 10^s$ P. S. T. in the smoke of the city